

Math 75 – Homework #8

posted May 15, 2008; due Monday, May 19, 2008

Exercises

1. Prove that there is a sequence of Reed–Solomon codes $RS(k, t)$ along which both the rate and minimum relative distance tend to the limit $1/2$.
2. In the May 12 lecture notes, one can find the following claim: for the code $BCH(k, t)$, if $p_{2^i-1}(x) = p_{2^j-1}(x)$ with $i < j$, then $(2^i - 1)(2^j - 1) > 2^k$. (Here $p_l(x)$ denotes the minimal polynomial of α^l , where α is a fixed generator of $\mathbb{F}_{2^k}^\times$.) Assuming this claim, prove that $BCH(k, t)$ has rank $n - kt$ for all integers $1 \leq 2t \leq 2^{k/2}$. (This generalizes Exercise 14.2 from the last assignment when $k \geq 4$.)
3. Do Exercise 18.1 and 18.7–18.9.
4. **Extra credit:** Prove the claim referred to in Exercise 2 above.